

regions, at a density exceeding 400 different polypeptides occupying a total area of less than 1 cm² on said substrate, said groups of polypeptides having different polypeptide sequences.

173. (New) The substrate as recited in claim 172, wherein said substrate comprises 10³ or more different groups of polypeptides with known sequences bound to discrete known regions of said substrate.

174. (New) The substrate as recited in claim 172, wherein said substrate comprises 10⁴ or more different groups of polypeptides with known sequences bound to discrete known regions of said substrate.

175. (New) The substrate as recited in claim 172, wherein said substrate comprises 10⁵ or more different groups of polypeptides with known sequences in discrete known regions.

176. (New) The substrate as recited in claim 172, wherein said substrate comprises 10⁶ or more different groups of polypeptides with known sequences in discrete known regions.

177. (New) The substrate as recited in claim 172, wherein said groups of polypeptides are at least 50% pure within said discrete known regions.

178. (New) The substrate as recited in claim 172, wherein the groups of polypeptides are attached to the surface by a linker.

179. (New) The substrate as recited in claim 172, wherein the groups of polypeptides are covalently attached to the surface.

180. (New) A substrate with a surface comprising a plurality of polypeptides with different, known sequences bound to the surface in discrete known regions, at a density exceeding 1000 different polypeptides occupying a total area of less than 1 cm² on said substrate, said groups of polypeptides having different polypeptide sequences.

1 181. (New) The substrate as recited in claim 180, wherein said substrate
2 comprises 10^3 or more different groups of polypeptides with known sequences bound to
3 discrete known regions of said substrate.

1 182. (New) The substrate as recited in claim 180, wherein said substrate
2 comprises 10^4 or more different groups of polypeptides with known sequences bound to
3 discrete known regions of said substrate.

1 183. (New) The substrate as recited in claim 180, wherein said substrate
2 comprises 10^5 or more different groups of polypeptides with known sequences in discrete
3 known regions.

1 184. (New) The substrate as recited in claim 180, wherein said substrate
2 comprises 10^6 or more different groups of polypeptides with known sequences in discrete
3 known regions.

1 185. (New) An array of more than 1,000 different groups of polypeptide
2 molecules with known sequences bound to a surface of a substrate, said groups of
3 polypeptide molecules each in discrete known regions and differing from other groups of
4 polypeptide molecules in monomer sequence, each of said discrete known regions being an
5 area of less than about 0.01 cm^2 and each discrete known region comprising polypeptides of
6 known sequence, said different groups occupying a total area of less than 1 cm^2 .

1 186. (New) The array as recited in claim 185, wherein said discrete known
2 region is less than about $1 \times 10^{-2} \text{ cm}^2$ to about $1 \times 10^{-5} \text{ cm}^2$.

1 187. (New) The method as recited in claim 186, wherein said discrete
2 known region is less than about $1 \times 10^{-2} \text{ cm}^2$ to about $1 \times 10^{-4} \text{ cm}^2$.

1 188. (New) The method as recited in claim 187, wherein said discrete
2 known region is less than about $1 \times 10^{-2} \text{ cm}^2$ to about $1 \times 10^{-3} \text{ cm}^2$.

1 189. (New) The array as recited in claim 185, made by the process of:

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(a) providing a polypeptide array comprising at least two different polypeptides immobilized on a surface, and wherein said polypeptides are synthesized on said surface;

(b) contacting said surface with a first protected amino acid wherein said first protected amino acid is selectively coupled to a functional group in a first selectively activated region of said surface;

(c) contacting said surface with a second protected amino acid without physical segregation of said surface such that said second protected amino acid is selectively coupled to a functional group in a second selectively activated region of said surface; and,

(d) repeating the above steps until at least two different polypeptides are formed at known locations on said substrate surface.

190. (New) The array as recited in claim 189, wherein said first selectively activated region of said substrate is exposed to light to remove a photoremovable group from said first protected amino acid.

191. (New) The array as recited in claim 185, comprising more than 10,000 groups of polypeptides of known sequences.

192. (New) An array of polypeptides, said array of polypeptides comprising:
a substrate having a surface; and
a plurality of different polypeptides bound to said surface at a density exceeding 400 different polypeptides/cm², wherein each of said plurality of different polypeptides is attached to said surface in a different known location of area greater than 100 square microns, has a different determinable sequence.

193. (New) The array of claim 192, wherein said substrate is a solid support.

194. (New) The array of claim 193, wherein said substrate is a solid support is a member selected from the group consisting of particles, strands, precipitates, gels, sheets, tubing, spheres, containers, capillaries, pads, slices, films, plates, slides.

1 195. (New) The array of claim 193, wherein said solid support is made of a
2 member selected from the group consisting of polymers, plastics, resins, polysaccharides,
3 silica or silica-based materials, carbon, metals, inorganic glasses, and membranes.

1 196. (New) The array of claim 193, wherein said solid support is glass.

1 197. (New) The array of claim 193, wherein said solid support is a gel.

1 198. (New) The array of claim 193, wherein said polypeptides are attached
2 to said solid support through a linker group.

1 199. (New) The array of claim 193, wherein said array comprises at least
2 1,000 different polypeptides attached to said solid support.

1 200. (New) The array of claim 193, wherein said array comprises at least
2 10,000 different polypeptides attached to said solid support.

1 201. (New) The array of claim 193, wherein said plurality of different
2 polypeptides attached to said surface are at a density exceeding 1000 different
3 polypeptides/cm².

1 202. (New) The array of claim 192, wherein each of said different known
2 locations is physically separated from each of the other known locations.

1 203. (New) The array of claim 192, wherein said polypeptides in said
2 different known locations comprise polypeptides that are at least 20% pure.

1 204. (New) The array of claim 192, wherein said polypeptides in said
2 different known locations comprise polypeptides that are at least 50% pure.

1 205. (New) The array of claim 192, wherein said polypeptides in said
2 different known locations are at least 80% pure.

1 206. (New) The array of claim 192, said polypeptides in said different
2 known locations are at least 90% pure.

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1 207. (New) The array of claim 192, wherein said array is produced by a
2 process comprising:

3 providing a planar, non-porous solid support, said solid support having a
4 plurality of compounds immobilized on a surface thereof, said compounds having protecting
5 groups coupled thereto; deprotecting a first portion of said plurality of compounds on said
6 surface and not a second portion of said plurality of compounds;

7 reacting said first portion of said plurality of compounds with a first reactant;
8 deprotecting at least a third portion of said plurality of compounds on said
9 surface, said third portion comprising a fraction of said first portion of said plurality of
10 compounds;

11 reacting said at least third portion of said plurality of compounds with a
12 second reactant; and

13 optionally repeating said synthesis steps to produce said polypeptide array.

1 208. (New) The array of claim 192, wherein said polypeptides in said
2 different known locations are at least 10% pure.

1 209. (New) The array of claim 192, wherein said support is rigid.

1 210. (New) An array of polypeptides, said array of polypeptides
2 comprising:

3 a planar rigid support having at least a first surface; and

4 a plurality of different polypeptides bound to said first surface of said planar
5 rigid support at a density exceeding 400 different polypeptides/cm², wherein each of said
6 different polypeptides is attached to said surface of said solid support and has a different
7 determinable sequence.

1 211. (New) The array of claim 210, wherein said density exceeds 1000
2 different polypeptides occupying a total area of less than 1 cm² on said substrate.

1 212. (New) The array of claim 210, wherein said plurality of different
2 polypeptides exceeds 1000 different groups wherein each of said plurality of different